

## Four New and Two Newly Recorded Species of Taiwanese Jumping Spiders (Araneae: Salticidae) Deposited in the United States

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**Xian-Jin Peng and Shu-Qiang Li (2002)** Four new and two newly recorded species of Taiwanese jumping spiders (Araneae: Salticidae) deposited in the United States. *Zoological Studies* 41(3): 337-345. The present paper reports on 6 species of jumping spiders from Taiwanese specimens collected during the 1930s and deposited in the United States. Among them, 4 are new to science (*Cytaea levii* sp. nov., *Dexippus taiwanensis* sp. nov., *Tauala elongata* sp. nov., and *Sitticus taiwanensis* sp. nov.) and the other 2 (*Pancorius magnus* Zabka 1985 and *Phintella debilis* (Thorell 1892)) are new records for Taiwan. Detailed morphological and genital characteristics are given. Updated distribution information is also provided. Except for *Sitticus* and *Phintella*, all genera are reported from Taiwan for the 1st time. <http://www.sinica.edu.tw/zool/zoolstud/41.3/337.pdf>

**Key words:** *Cytaea*, *Dexippus*, *Tauala*, *Sitticus*, *Pancorius*, *Phintella*.

In recent years, due to large-scale habitat destruction and fragmentation, almost all ecosystems in Taiwan have experienced severe impact. Only a few isolated areas still exhibit their original flora and fauna. Owing to such a rapid rate of habitat destruction, many species may have disappeared long before they could be collected and described. One of the ways to retrieve information on species that are currently difficult to find but were once quite abundant is to examine specimens collected in the early 1900s when natural habitats in Taiwan were more intact.

The study of Taiwanese spider diversity can be dated back to as early as 1901. The 1st documented study was conducted by R.I. Pocock, who collected and published *Macrothele holsti* in 1901 (reviewed by Lee 1964). After that, Europeans, Americans, and Japanese frequently visited Taiwan and deposited specimens in various museums and institutes. Many museums in the United States and Europe still maintain a good collection of Taiwanese spiders obtained during the early 1900s (J. Haupt, pers. commun.). Therefore, in addition to conducting comprehensive collections

on existing fauna, examining Taiwanese specimens deposited in various museums or institutes may potentially produce fruitful results. However, to date, there is no published study of these specimens deposited in other countries.

One of the authors (X. J. Peng) visited the Museum of Comparative Zoology, Harvard Univ. and the American Museum of Natural History, New York from 1998 to 1999 examining jumping spider specimens collected during the 1930s from mainland China and neighboring islands. Jumping spiders are the most diverse family in the order Araneae and represent approximately 13% of global spider diversity (Platnick 1998). In Taiwan, however, due to a lack of systematic surveys, less than 7% of the known spider fauna are salticids (Chen 1996). From the taxonomic study of Taiwanese specimens deposited at these 2 museums, we found 6 species from 6 genera to be new to Taiwan. Among them, 4 are new to science and the other 2 are new record species. The result of this study suggests that examining existing museum specimens should be considered an indispensable part of future biodiversity studies of Taiwan.

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In this paper, we describe the external morphology and genital structures of these 6 species, and also provide updated distribution information. All type specimens are deposited at the Museum of Comparative Zoology, Harvard Univ. One paratype of *Cytaea levi* sp. nov. is deposited at the American Museum of Natural History, New York. Measurements are given in millimeters (mm). Legs are measured as follows: total length (length of femur, length of patella and tibia, length of metatarsus, length of tarsus). Scale bars equal 1.00 mm for all figures of the body and 0.10 mm for figures of genital structures. Abbreviations used in this paper are: AER, anterior eye row; ALE, anterior lateral eye; AME, anterior median eye; EFL, length of eye field; PER, posterior eye row; PLE, posterior lateral eye; MCZ, Museum of Comparative Zoology, Harvard Univ.; and AMNH, American Museum of Natural History, New York. The original labels of most specimens examined did not specify the collector. In this paper, we use MCZ or AMNH as collector of all Taiwanese specimens examined. Some of the paratypes examined were collected from Taiwan recently and are deposited in the National Museum of Natural History (NMNH), Taichung, Taiwan.

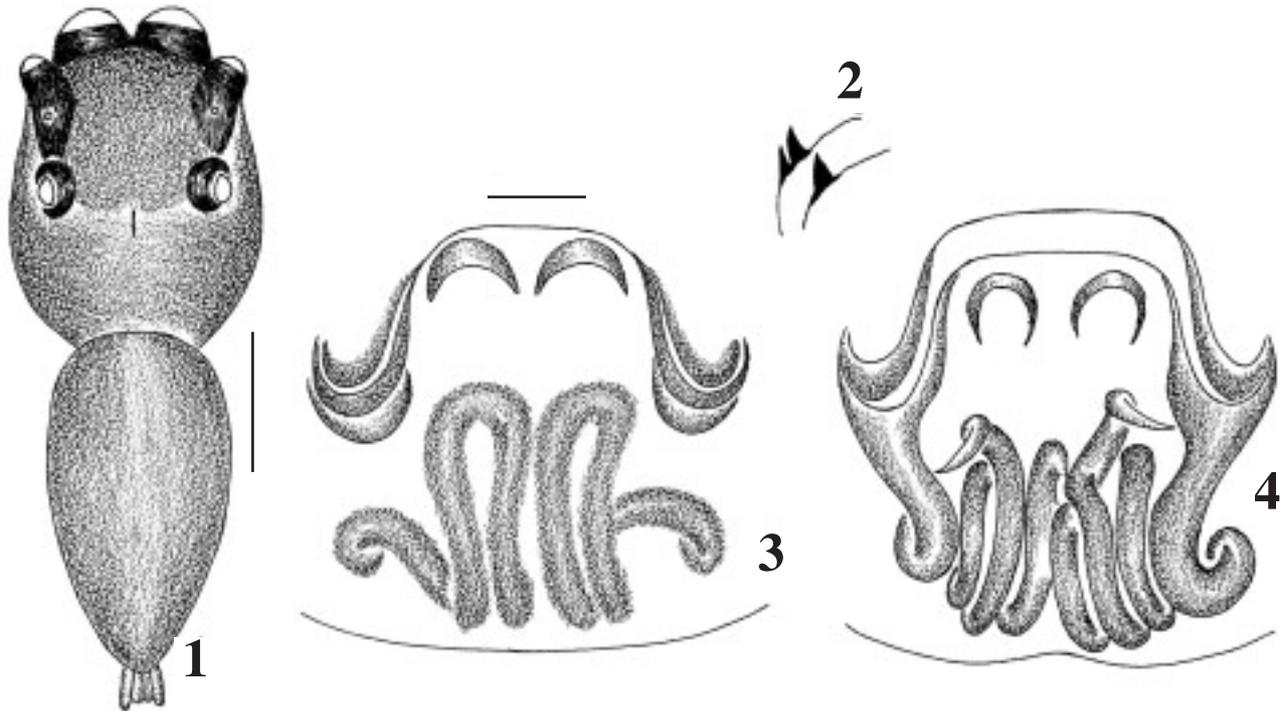
## SPECIES ACCOUNT

### *Cytaea levi* sp. nov.

(Figs. 1-4)

*Female*: Total length 5.10-6.40. Holotype type measured. Total length 5.10. Carapace length 2.50, width 2.10. Abdomen length 2.60, width 1.20. AER 1.70, PER 1.60, EFL 1.20, AME 0.60, ALE 0.25, PLE 0.25. Legs: I 5.90 (1.90, 2.30, 1.00, 0.70); II 5.80 (1.90, 2.20, 1.00, 0.70); III 6.90 (2.10, 2.20, 1.40, 1.20); IV 5.90 (1.90, 2.00, 1.20, 0.80); formula 3, 4, 1, 2.

Carapace (Fig. 1) light grayish brown with sparse hairs; lateral sides of ocular area black to dark brown; AER strongly recurved; fovea short and longitudinal; cervical and radial grooves not very clear. Sternum widely oval, light yellowish brown with sparse hairs; 4 pairs of dark gray radial marks corresponding to coxae of legs. Clypeus yellowish brown with dense long white hairs; height slightly longer than 1/2 of radius of AME. Chelicera light brown with 2 promarginal and 1 retromarginal teeth (Fig. 2). Endites and labium yellowish brown, distal areas lightly colored with dense hairs. Palps light yellowish brown without



**Figs. 1-4.** *Cytaea levi* sp. nov. 1. Body of female. 2. Teeth on chelicera. 3. Epigynum. 4. Vulva.

spines. Legs yellowish brown without a distinct annulus; hairs sparse; tibiae and metatarsi with strong ventral spines: tibia I with 4 pairs, tibia II with 3 pairs, metatarsi I and II with 2 pairs. Abdomen (Fig. 1) elongated oval. Dorsum grayish yellow, no distinct markings. Ventral side grayish brown. Spinnerets yellowish brown.

Epigynum (Fig. 3) weakly sclerotized, internal structure clearly visible before maceration; 2 crescent hoods on anterior end; copulatory opening hook-shaped. Vulva (Fig. 4): spermathecae not distinctly swollen; canals mostly arranged longitudinally, distal portion trumpet-shaped.

*Type specimen*: 1 ♀, Taihoku (Taipei City), 2 May 1934, MCZ, no. MCZ-Peng-8.

*Distribution*: Taiwan.

*Diagnosis*: The new species is allied to *C. alburna* Keyserling, 1882 (Davis and Zabka 1989: 226), but differs by: 1. the epigynum without a septum as found in that of *C. alburna*; 2. epigynum with 2 crescent hoods, which are absent from that of *C. alburna*; 3. copulatory opening complicated, with hook-shaped apophyses; that of *C. alburna* very simple; 4. the courses of the copulatory canals greatly differ; and 5. the new species lacks a distinct mark on the abdominal dorsum; that of

*C. alburna* has distinct marks.

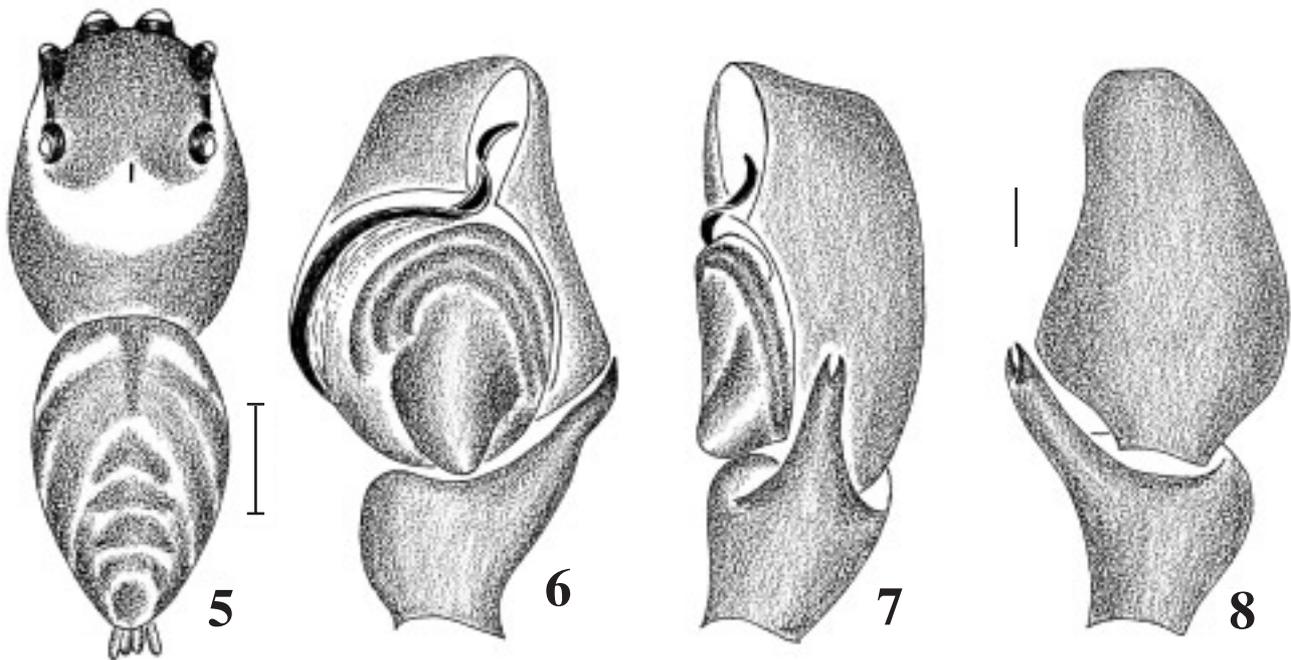
*Etymology*: The specific name is a patronym in honor of H. W. Levi, who helped X. J. Peng so much during his stay at Harvard Univ.

***Dexippus taiwanensis* sp. nov.**

(Figs. 5-8)

*Male*: Total length 6.20. Carapace length 3.20, width 2.40. Abdomen length 3.00, width 2.10. AER 1.90, PER 1.85, EFL 1.30, AME 0.60, ALE 0.30, PLE 0.30. Legs: I 6.70 (2.20, 2.60, 1.20, 0.70); II 5.70 (1.80, 2.30, 1.00, 0.60); III 6.40 (2.20, 2.30, 1.20, 0.70); IV 6.00 (2.00, 2.10, 1.20, 0.70); formula 1, 3, 4, 2.

Carapace (Fig. 5) dark brown with dense white hairs; base of each eye, lateral sides of ocular area, and carapace margin black; fovea longitudinal and black; a large light brown mark with dense white hairs behind ocular area extending to lateral sides of carapace; cervical and radial grooves indistinct. Sternum shield-shaped, anterior margin about as wide as posterior one; hairs brown and long; light brown with darker margin. Clypeus brown with long brown hairs; height about as long as radius of AME. Chelicera dark brown,



**Figs. 5-8.** *Dexippus taiwanensis* sp. nov. 5. Body of male. 6. Palpal organ, ventral view. 7. Palpal organ, retrolateral view. 8. Palpal organ, dorsal view.

2 promarginal and 1 retromarginal teeth. Endites and labium dark brown, distal areas lightly colored with dense hairs. Palps and legs black brown with long white or brown hairs; legs I and II dark brown, ventral sides with long spines and brush-like hairs; tibiae I and II with 3 pairs of ventral spines, metatarsi I and II with 2 pairs; legs III and IV light brown with darker annuli, spines long and dense. Abdomen (Fig. 5) oval, slightly wider anteriorly. Dorsum grayish black with lightly colored transverse marks; cardiac pattern brown. Ventral sides with wide grayish-black longitudinal bands on median area; lateral areas with inclined gray striae. Spinnerets grayish black. Palpal organ (Figs. 6-8): Embolus belt-shaped with twisted terminal portion; originating at an 8 o'clock position. Bulb with large posterior conic lobe. Tibial apophysis long and bifurcated. Ejaculatory sperm duct clearly visible.

*Type specimen*: 1 ♂, Rokki (Liukuei), Kaohsiung County, 13-20 May 1934, MCZ, no. MCZ-Peng-4.

*Distribution*: Taiwan.

*Diagnosis*: The new species resembles *D. kleini* Thorell, 1891 (Proszynski 1984: 33), but can be distinguished by: 1. embolus much longer and originating at an 8 o'clock position; that of *D. kleini* originating at an 11:00 o'clock position; 2. posterior lobe much bigger; 3. incision on terminal end of tibial apophysis much shallower; and 4. abdominal markings quite different; *D. kleini* with only 2 longitudinal narrow bands, but without distinct transverse bands found in the new species.

*Etymology*: The specific name is derived from the type locality, Taiwan.

### ***Pancorius magnus* Zabka, 1985**

(Figs. 9-15)

*Pancorius magnus* Zabka, 1985: 422-424, figs. 387-400 (♀, ♂)

*Measurements*: Total length 5.50-7.00 (♂)/9.30-11.09 (♀). Specimens of 5.50/9.30 measured. Carapace length 3.00/3.80, width 2.50/3.20. Abdomen length 2.80/5.50, width 1.80/4.00. AER 2.25/2.70, PER 2.15/2.60, EFL 1.30/1.80.

*Male*: Carapace (Fig. 9) brown; base of each eye, lateral areas, and margin black brown; densely covered with white hairs; with a depression between PME and PLE; fovea longitudinal, black brown; cervical and radial grooves indistinct; median area of thoracic region lightly colored, light brownish. Sternum shield-shaped, light brown

with long brown hairs; margin dark brown. Clypeus very narrow, height shorter than radius of AME; anterior margin densely covered with long white hairs. Chelicera robust and strong, dark brown; 2 promarginal and 1 retromarginal teeth (Fig. 10). Endites and labium dark brown, distal area lightly colored with dense hairs. Leg I robust and strong; dark brown with short white hairs; dense brown brush-like hairs covering ventral sides of femur, tibia, metatarsus, and tarsus. Brush-like hairs on ventral side of leg II slightly sparser. Spines dense and strong: tibiae I and II with 3 pairs of ventral spines, metatarsi I and II with 2 pairs. Abdomen (Fig. 9) elongated oval with slightly wider anterior margin. Dorsum grayish black, median area lightly colored; lateral areas with many inclined black striae; posterior median with 5 to 6 herring-bones; two pairs of muscular depressions. Ventral side light yellow; median area with gray longitudinal bands. Spinnerets grayish brown. Palpal organ (Figs. 11-13): embolus short, finger-shaped; tibial apophysis long, slightly sinuous.

*Female*: Similar to male in coloration and patterns, but longitudinal bands on abdominal median area narrower, inclined striae on lateral area of abdomen longer; ventral side of abdomen yellowish brown with 3 dark gray longitudinal bands on median area, and inclined or reticulate marks on lateral areas. Epigynum (Fig. 14): 2 angular hoods connected at the base near the epigastric furrow; copulatory opening narrow, diagonal and brow-shaped. Vulva (Fig. 15) with 2-chamber spermathecae, lower chamber much larger than upper one.

*Specimens examined*: 1 ♂, Rokki (Liukuei), Kaohsiung County, Taiwan, 13-20 May 1934, MCZ; no. MCZ-Peng-2; 2 ♂ ♂, Rokki (Liukuei), Kaohsiung County, Taiwan, 14 May 1934, MCZ; 1 ♂, Bukai (Wuchieh), Nantou County, 14 February 1934, MCZ; 1 ♂ 1 ♀, Hui-Sun Experimental Forest Station, Nantou County, October 1998, Leg. Hai-Yin Wu (♂ THU-Ar-00-0015; ♀ THU-Ar-00-0014).

*Distribution*: Vietnam, Taiwan.

### ***Tauala elongata* sp. nov.**

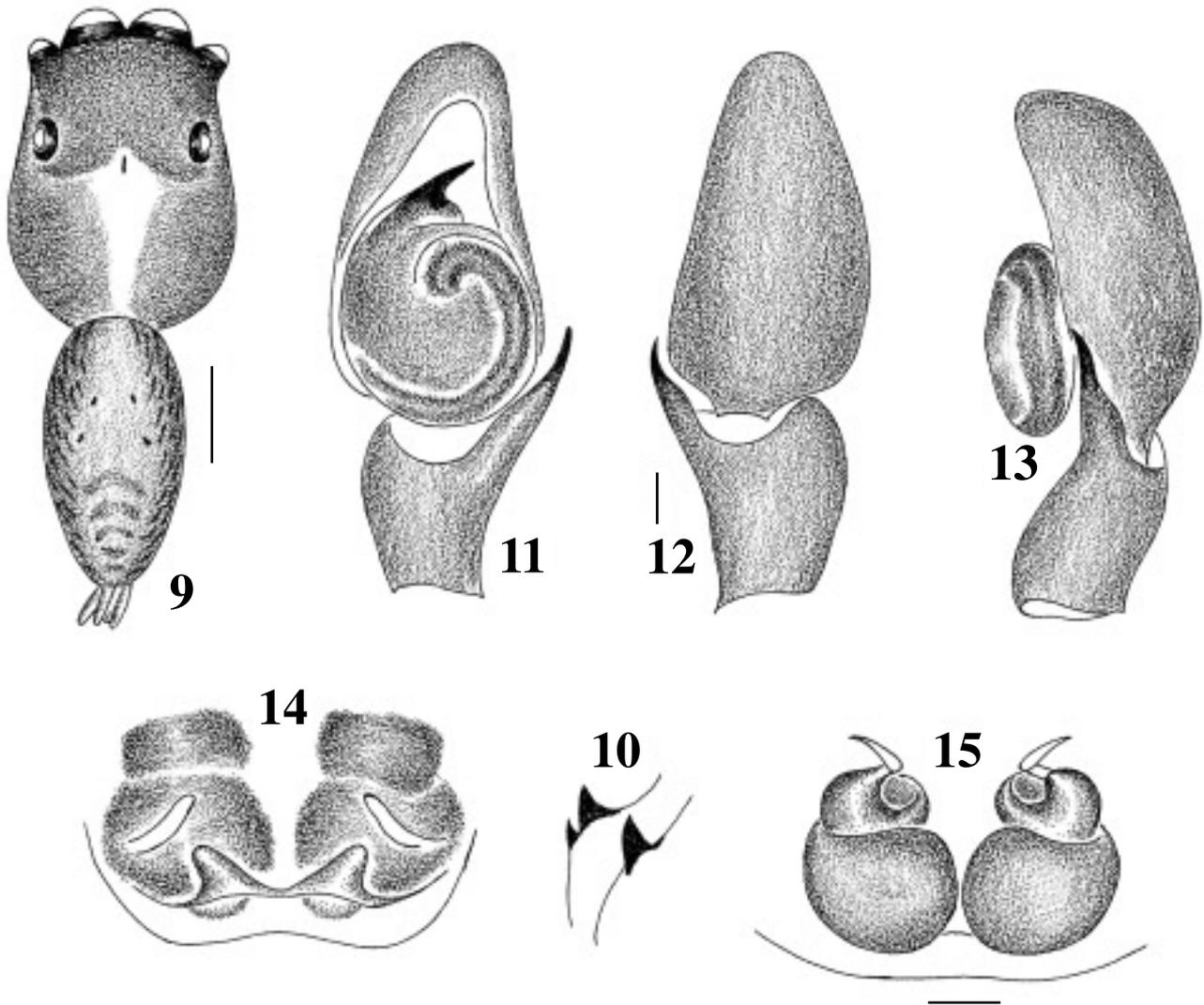
(Figs. 16-20)

*Male*: Total length 3.40. Carapace length 1.40, width 0.90. Abdomen length 2.00, width 0.70. AER 0.75, PER 0.80, EFL 0.50, AME 0.30, ALE 0.15, PLE 0.15. Legs: I 2.65 (0.75, 1.10, 0.60, 0.20); II 1.60 (0.50, 0.60, 0.30, 0.20); III 1.45 (0.45, 0.50, 0.30, 0.20); IV 2.05 (0.60, 0.80, 0.45,

0.20); formula 1, 4, 2, 3.

Carapace (Fig. 16) dorsoventrally flat; brown with black margin and lateral sides of ocular area; hairs short and white; 2 bar-shaped marks on median area of ocular area; fovea indistinct; cervical and radial grooves dark brown. Sternum shield-shaped; slightly wider anteriorly; length about twice as long as width; brown with darker margin; hairs sparse and white. Clypeus very narrow with several brown or white setae. Chelicera light brown with 2 promarginal and 3 retromarginal teeth (Fig. 17). Endites and labium grayish brown; distal area lightly colored with dense hairs. Palp grayish black except white tibia and tarsus. Leg I (Fig. 18) robust and strong; dark brown except

light brown metatarsus and tarsus; basal portion of metatarsus with grayish-black striae; tibia I very swollen, its ventral side with 2 promarginal and 3 retromarginal strong spines, also with feather-like hairs; metatarsus I with 2 pairs of strong ventral spines; legs II, III, and IV weak and thin; no spine; light brown with grayish-black longitudinal lines. Abdomen (Fig. 16) elongated cylindrical; dorsum dark gray without clear markings; ventral side gray without markings. Spinnerets grayish brown. Epigynum (Fig. 19): weakly sclerotized, internal structure clearly visible; copulatory opening longitudinally semicircular. Vulva (Fig. 20): spermatheca not distinctly swollen; accessory gland finger-shaped, located at terminal portion of copulatory



**Figs. 9-15.** *Pancorius magnus* Zabka, 1985. 9. Body of male. 10. Teeth on chelicera of male. 11. Palpal organ, ventral view. 12. Palpal organ, dorsal view. 13. Palpal organ, retrolateral view. 14. Epigynum. 15. Vulva.

canal closer to opening than to spermatheca; terminal portion of canal swollen and trumpet-shaped.

*Type specimen*: 1 ♀, Hassenzan (Pahsien-shan), Taichung County, 22-28 June 1934, MCZ, no. MCZ-Peng-12.

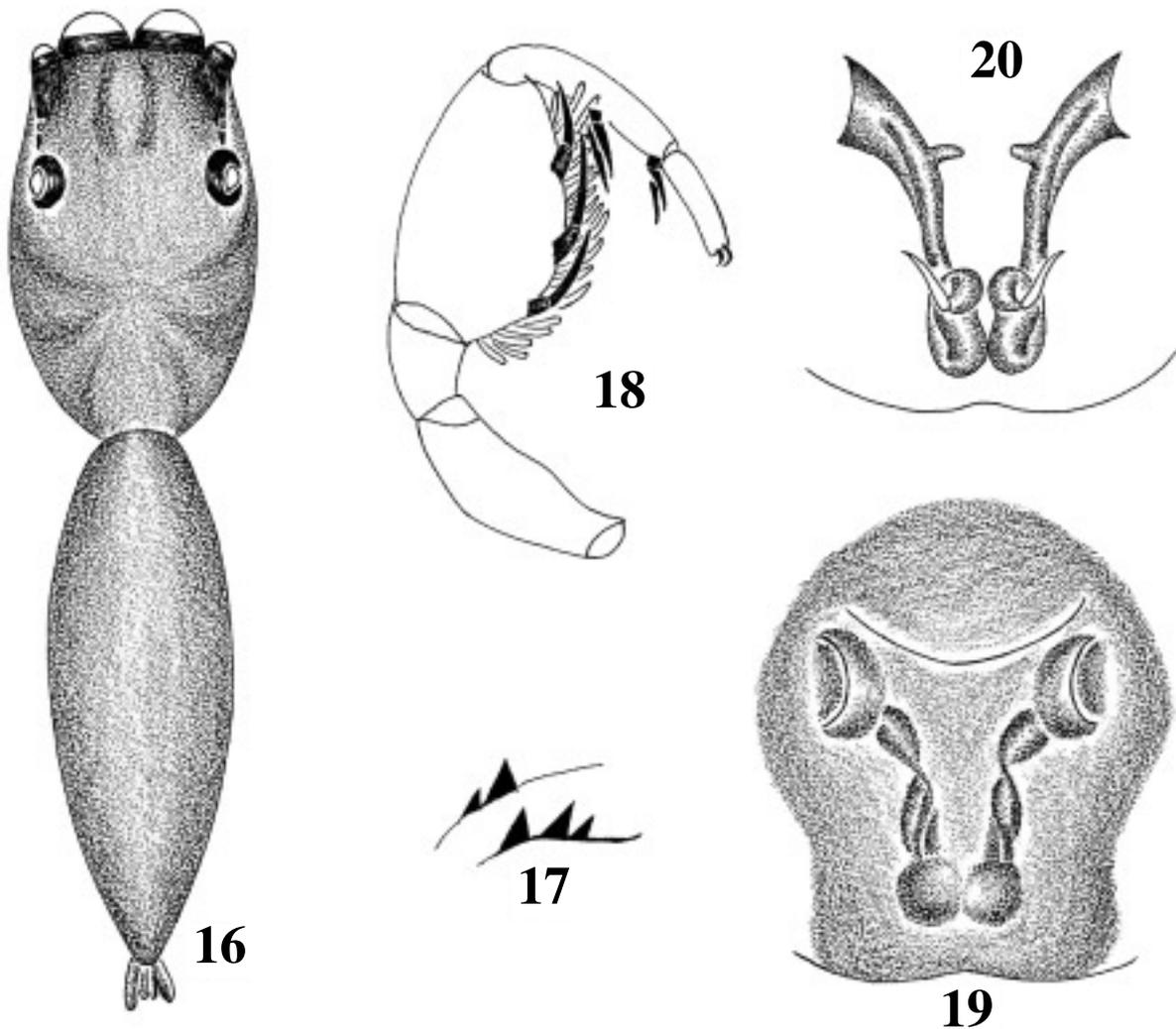
*Distribution*: Taiwan.

*Diagnosis*: The new species is similar to *T. lepidus* Wanless, 1988 (Wanless 1988: 123, Figs. 19A-F), but differs by: 1. copulatory opening much larger, longitudinally semicircular in the new species, while much smaller and circular in *T. lepidus*; 2. spermathecae spherical in *T. lepidus*, but tube-shaped in the new species; 3. accessory gland located at the terminal portion of copulatory canal closer to opening than to spermatheca in the new species, but at the position where the sper-

matheca and copulatory canal connect in *T. lepidus*; 4. copulatory canal much bigger with trumpet-shaped terminal portion in the new species, while much thinner and even in *T. lepidus*; 5. tibia I very swollen with feather-like hairs on ventral side in the new species, but not swollen and with brush-like hairs on ventral side in *T. lepidus*; and 6. abdominal dorsum without clear markings in the new species, but with distinct markings in *T. lepidus*.

*Etymology*: The specific name is derived from the form of the elongated oval abdomen of the new species.

***Phintella debilis* (Thorell, 1892)**  
(Figs. 21-25)



**Figs. 16-20.** *Tauala elongata* sp. nov. 16. Body of female. 17. Teeth on chelicera. 18. Leg I. 19. Epigynum. 20. Vulva.

*Chrysilla debilis* Thorell, 1892: 319, 474.

*Phintella debilis*: Zabka, 1985: 425-426, figs. 408-419.

**Female:** Total length 3.50-4.20. The specimen of 3.50 measured. Carapace length 1.50, width 1.30. Abdomen length 2.00, width 1.20. AER 1.20, PER 1.15, EFL 0.80, AME 0.40, ALE 0.20, PLE 0.20.

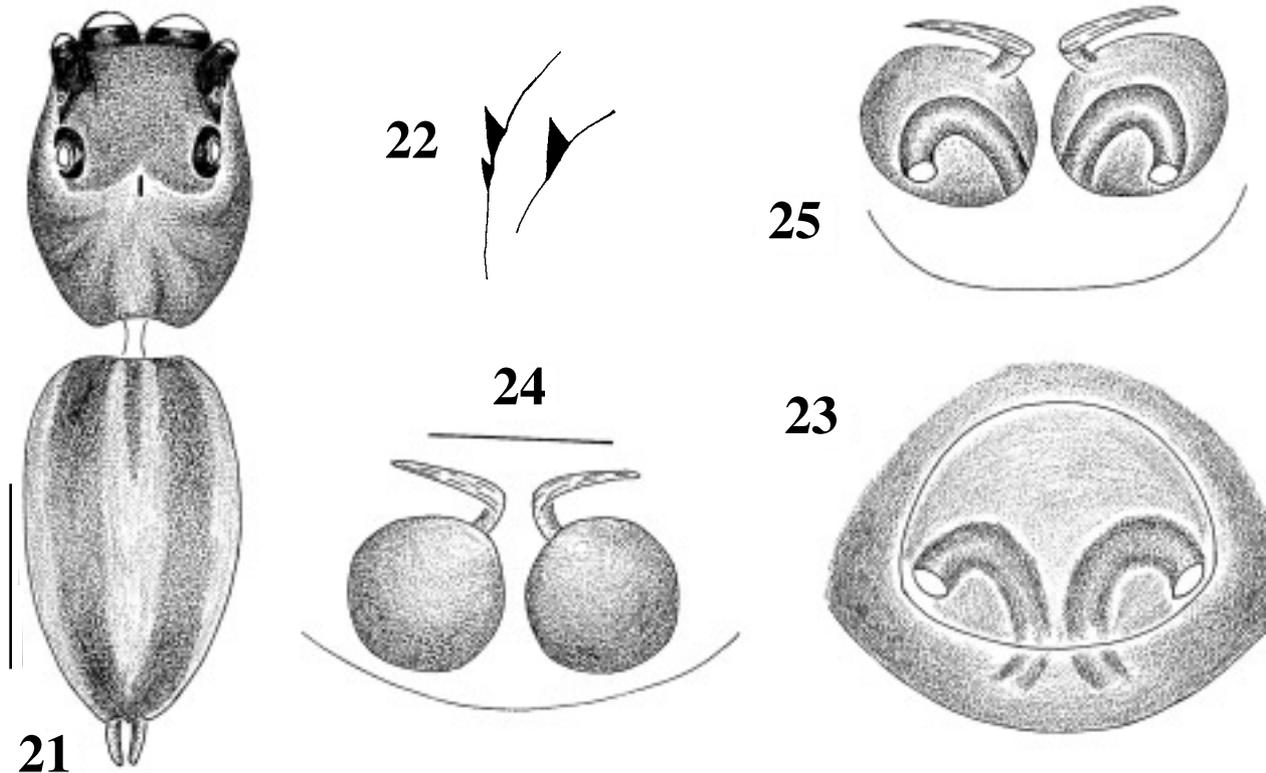
Carapace (Fig. 21) brown; base of each eye, lateral sides of ocular area, and carapace margin black; hairs white and short; lateral sides and anterior margin of ocular area with long brown hairs; fovea reddish brown and short; in front of it with a grayish-black transverse arced line. Radial grooves grayish black. Sternum widely oval, slightly wider anteriorly; grayish brown with short sparse brown hairs. Clypeus dark brown with 3 long stout brown setae, height about as long as radius of AME. Endites, labium and chelicera brown, 2 promarginal and 1 retromarginal teeth (Fig. 22). Palp light yellowish white with long white hairs. Legs light yellowish brown; annulus not very clear; spines dense but weak; tibiae I and II

with 3 pairs of long ventral spines, metatarsi I and II with 2 pairs. Abdomen (Fig. 21) almost cylindrical, anterior margin slightly wider. Dorsum light yellowish white; 2 wide brown longitudinal bands running from anterior margin to posterior one and merging posteriorly; cardiac mark grayish black and bar-shaped. Ventral side light yellowish white with grayish-black longitudinal bands on median and lateral areas. Spinnerets grayish black. Epigynum (Fig. 23) weakly sclerotized with internal structure clearly visible before maceration; atrium large and subcircular; copulatory opening circular. Vulva (Figs. 24-25): Spermatheca large, spherical; copulatory canal short arc-shaped, located at ventral side of spermatheca, only visible in ventral view.

**Specimens examined:** 1 ♀, Hori (Puli), Nantou County, Taiwan, 17 June 1934, MCZ; 1 ♀, Rokki (Liukuei), Kaohsiung County, Taiwan, 13-20 May 1934, MCZ; no. MCZ-Peng-17.

**Distribution:** India to Java, Taiwan.

***Sitticus taiwanensis* sp. nov.**



**Figs. 21-25.** *Phintella debilis* (Thorell 1892). 21. Body of female. 22. Teeth on chelicera. 23. Epigynum. 24. Vulva, dorsal view. 25. Vulva, ventral view.

(Figs. 26-29)

*Female*: Total length 3.80-4.70. The specimen of 4.70 measured. Carapace length 2.20, width 1.80. Abdomen length 2.50, width 2.00. AER 1.65, PER 1.60, EFL 0.90, AME 0.50, ALE 0.30, PLE 0.30. Legs: I 3.75 (1.25, 1.40, 0.60, 0.50); II 3.65 (1.25, 1.30, 0.60, 0.50); III 4.15 (1.30, 1.35, 0.90, 0.60); IV 4.50 (1.40, 1.40, 1.10, 0.60); formula 4, 3, 1, 2.

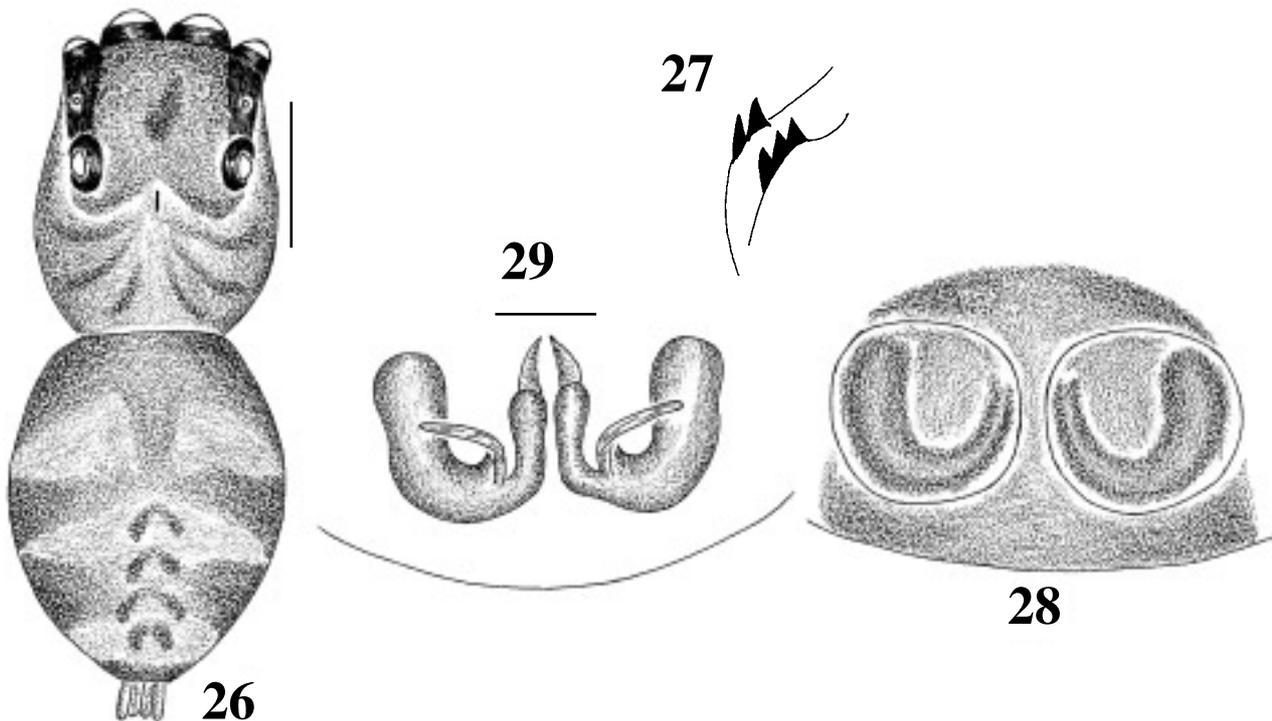
Carapace (Fig. 26) dark brown; base of each eye, lateral sides of ocular area, and carapace margin black; ocular area dark brown with a black angular mark; fovea longitudinal, dark brown; radial grooves dark brown; white hairs covering area around each eye, lateral sides, and anterior margin of ocular area. Sternum shield-shaped with slightly wider anterior margin; brownish gray, margin darker; hairs sparse, brown and short. Clypeus brown with several long brown or white hairs; height about the radius of AME. Chelicera brown; 2 promarginal teeth; posterior fissidentati with 3 cusps (Fig. 27). Endites and labium brown, distal area lightly colored with dense hairs. Palp and legs brown with dark annuli or lines; spines dense and strong; tibiae I and II with 3 pairs of

long ventral spines, metatarsi I and II with 2 pairs; dorsal and lateral spines dense and long. Abdomen (Fig. 26) widely oval with anterior margin slightly wider. Dorsum: yellowish brown with grayish-black marks; cardiac pattern bar-shaped; three transverse bands; posterior median area with 4 herring-bone marks. Ventral side light yellowish brown; median area with 3 visible but not very clear longitudinal lines; also with many scattered dark gray dots. Spinnerets brown. Epigynum (Fig. 28) weakly sclerotized; internal structure visible before maceration; atrium large, circular and separated by a narrow septum. Vulva: spermatheca cylindrical, distal end slightly swollen; copulatory canal short; accessory gland large and angular (Fig. 29).

*Holotype*: ♀, Hassenzan (Pahsienshan), Taichung County, 22-28 June 1934, MCZ, no. MCZ-Peng-10.

*Distribution*: Taiwan.

*Diagnosis*: The new species is allied to *S. wuae* Peng, Tso et Li 2002, but can be distinguished from *S. wuae* by: 1. the shorter spermatheca, distal portion without a branch twisting to ventral side as found in *S. wuae*; 2. spermatheca of *S. wuae* with short but large lateral branch at the



**Figs. 26-29.** *Sitticus taiwanensis* sp. nov. 26. Body of female. 27. Teeth on chelicera. 28. Epigynum. 29. Vulva.

position where the fertilization duct is located, which is absent from the new species; 3. retromarginal fissentati with only 3 cusps in the new species, but with 6 cusps in *S. wuae*; and 4. abdominal patterns also quite different.

*Etymology*: The specific name is derived from the type locality, Taiwan.

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Peng during his stay at their museum in 1998-1999. This study was supported by the National Natural Sciences Foundation (Grant No. 39970102), the President Foundation of the Chinese Academy of Sciences, Grant for systematic and evolutionary biology, CAS, and special support project of the department of Biology, CAS (STZ-00-19) to Shu-Qiang Li.

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## 典藏於美國之臺灣蠅虎標本四新種及兩新記錄種描述（蜘蛛目：蠅虎科）

彭賢錦 李樞強

本文記述了六種典藏於美國哈佛大學比較動物學博物館採集於1930年代之臺灣蠅虎標本。其中有四個新種，即：列偉胞蛛 (*Cytaea levii* sp. nov.)、臺灣右蛛 (*Dexippus taiwanensis* sp. nov.)、長牛蛛 (*Tauala elongata* sp. nov.)和臺灣褐蠅虎，新種 (*Sitticus taiwanensis* sp. nov.)。兩個新記錄種為：大盤蛛 (*Pancorius magnus* Zabka, 1985)和柔弱條斑蠅虎 (*Phintella debilis* (Thorell, 1892))。除 *Sitticus*及 *Phintella*外，其餘各屬皆為首次於臺灣發現。本文中，每個種都附有詳盡的外形及生殖器結構特徵圖、文字描述和已知的地理分布資料。

**關鍵詞**：胞蛛，右蛛，牛蛛，盤蛛，條斑蠅虎。